

plasma being carried out in a first etching process, and trenches (21') being formed by anisotropic etching in the region of the lateral recesses (21); at least one separating layer (12, 14, 14', 16) being buried between the first silicon layer (15) and a further silicon layer (17, 17'), and the first etching process coming at least almost to a standstill upon reaching the at least one separating layer; and the separating layer (12, 14, 14', 16) subsequently being etched through in an exposed region (23, 23') by a second etching process, and a third etching process then etching the further silicon layer (17, 17'); wherein a  $(\text{CF}_2)_n$  film (20) is built up on side walls of the trenches (21') prior to the second etching process.

Please cancel claims 34 and 36-38 without prejudice to the subject matter contained therein.

#### **REMARKS**

Claims 32-33, 35 and 39-69 are currently pending in this Application, with claims 34 and 36-38 having been canceled. In the Office Action mailed July 5, 2002, claims 32, 35, 39-52, 54-61 and 64-69 were allowed, while claims 53 and 63 were noted as allowable if amended to incorporate the limitations of their respective base and intervening claims. Claims 36-38 were rejected under 35 U.S.C. § 112, second paragraph due to lack of antecedent basis for a claim term. Claims 33, 36-38 and 62 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,313,836 to Fujii, *et al.* ("Fujii") in view of publication Silicon Processing for the VLSI Era, Vol. 1: Process Technology, S. Wolf and R. Tauber, Lattice Press 1986, ISBN 0-961672-3-7 ("Wolf") and in further view of U.S. Patent No. 6,211,092 to Tang, *et al.* ("Tang"). Claim 34 was rejected under § 103(a) as being unpatentable over Fujii, Wolf and Tang, and in further view of U.S. Patent No. 4,310,380 to Flamm, *et al.* ("Flamm"). The Applicants further note the Examiner's objection to improper trademark usage in the specification, and appropriate changes will be provided upon completion of the prosecution on the merits.

The Applicants have reviewed the July 5, 2002 Office Action, and respectfully submit the foregoing amendments and following remarks in response thereto. The Applicants wish to express their gratitude for the courtesies extended during the recent Interview in this case, and for the Examiner's allowance of claims 32, 35, 39-52, 54-61 and 64-69.

The Applicants have canceled claims 36-38, thereby rendering the pending § 112, second paragraph, rejection moot. The Applicants have further amended claim 33 to more specifically define the timing of the  $(\text{CF}_2)_n$  deposition, and have canceled claim 34. The Applicants wish to express their appreciation for the indication that claims 53 and 63 would be allowable if amended to incorporate their respective base and intervening claims. However, because the Applicants believe that claim 33, as amended, is patentable over the cited references for the reasons set forth below, the Applicants respectfully decline the invitation to amend claims 53 and 63 at this time.

In view of the foregoing amendments and the following remarks, the Applicants respectfully request reconsideration of the pending rejections and allowance of claims 33, 53 and 62-63, in addition to allowed claims 32, 35, 39-52, 54-61 and 64-69.

**1. Amended Claim 33 Is Patentable Over Fujii, Wolf and Tang Under § 103(a).**

The Applicants respectfully traverse the § 103(a) rejection of pending claims 33 and 62 since the cited references do not teach or suggest all the features of the present invention.

As amended, claim 33 recites, *inter alia*, a method for anisotropic plasma etching of a first silicon layer down to a separating layer, a second etching process to penetrate the separating layer, and a third etching process for removing a portion of a further silicon layer under the separating layer, wherein “a  $(\text{CF}_2)_n$  film (20) is built up on side walls of the trenches (21’) *prior to the second etching process.*” Amended claim 33, lines 9-10. ↵

The July 5, 2002 Office Action asserts that it is known in the art that “any fluoro or chloro - carbon containing etching gas will form polymer on the side- wall of the trench,” and further states that Tang discloses an etching process in which a polymer-forming gas is introduced for etch selectivity and also for providing side-wall passivation. (July 5, 2002 Office Action at p. 3-4).

Review of Tang reveals that this reference does not disclose deposition of a protective polymer coating on the side walls *before a second etch* is initiated to penetrate a separating layer. Rather, Tang principally teaches that when a separating  $\text{SiN}_x$  layer (a distinctly different material from the adjacent  $\text{SiO}_2$  layers) is to be penetrated, the addition of hexafluoroethane to the etching gases significantly enhances their selectivity for the nitride separating layer. Tang at 9:52-57. Tang goes on to note that, as an ancillary effect, the hexafluoroethane also provides some small amount of sidewall passivation while the penetration of the separating  $\text{SiN}_x$  layer is being performed. *Id.* at

9:57-59. Importantly, however, there is no other mention of such passivation in Tang, i.e., nothing that either teaches or suggests the addition of  $(CF_2)_n$  *before* the separating layer penetration etching process.

For example, Tang teaches nothing that would suggest to one of ordinary skill to introduce  $(CF_2)_n$  during the first etching of the  $SiO_2$  layer above the separating layer (in which a different combination of etching constituents is used in comparison to that used to etch the separating layer  $SiN_x$ ) -- *e.g.*, there is no discussion of a need or desire to protect the sidewalls from further erosion as the first etch trench depth increases, or any discussion of how the first etching process, with its different etching constituents and other parameters, would have to be adjusted to accommodate the addition of the  $(CF_2)_n$ . Indeed, Tang's sole focus when discussing the ancillary passivation is the additional protection of the lower via holes in the Tang structure against bowing during the second etch process. Thus, the Applicants respectfully maintain that Tang does not disclose or suggest the broad application of  $(CF_2)_n$  films for which it is cited, and that there is no teaching or suggestion that it be combined with Fujii and Wolf to obtain the invention recited in amended claim 33. Furthermore, since Fujii and Wolf fail to remedy this deficiency of Tang, the suggested combination would still fail to approximate the claimed invention of claim 33. Accordingly, the Applicants respectfully request the pending § 103(a) rejection of claim 33 and its dependent claim 62 be reconsidered and withdrawn.

### **Conclusion**

In view of the foregoing amendments and remarks, it is respectfully submitted that entry of the proposed amendments would place the presently pending claims in condition for allowance. The Applicants therefore earnestly solicit entry of the amendments and issuance of a Notice of Allowance for claims 32-33, 35 and 39-69.

The Examiner is invited to contact the undersigned to discuss any matter concerning this application.

**PATENT**  
**Ser. No. 09/581,663**  
**Atty. Docket No. 10191/1466**

The Office is hereby authorized to charge any additional fees under 37 C.F.R. § 1.16 or § 1.17 or credit any overpayment to Deposit Account No. 11-0600.

Respectfully submitted,

Dated: October 7, 2002

*for Richard L. Mayer (by)*  
Richard L. Mayer  
Registration No. 22,490  
*John*  
*R. No. 36,197 )*

KENYON & KENYON  
One Broadway  
New York, NY 10004  
Tel. No.: (212) 425-7200  
Fax No.: (212) 425-5288

**CUSTOMER NO. 26646**  
PATENT & TRADEMARK OFFICE

**MARKED UP VERSION OF AMENDMENTS**

**IN THE CLAIMS:**

33. (Once Amended) A method for etching a silicon layered body, which has a first silicon layer (15) that is provided with an etching mask (10) for defining lateral recesses (21); work with a plasma being carried out in a first etching process, and trenches (21') being formed by anisotropic etching in the region of the lateral recesses (21); at least one separating layer (12, 14, 14', 16) being buried between the first silicon layer (15) and a further silicon layer (17, 17'), and the first etching process coming at least almost to a standstill upon reaching the at least one separating layer; and the separating layer (12, 14, 14', 16) subsequently being etched through in an exposed region (23, 23') by a second etching process, and a third etching process then etching the further silicon layer (17, 17'); wherein a  $(CF_2)_n$  film (20) [being] is built up on side walls of the trenches (21') [at least one of in the course of the first etching process,] prior to the [third] second etching process [and during the third etching process].